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WHAT IS CLAIMED IS:

1. A method of stimulating bone formation in an individual, comprising the step of:

inducing an interaction between Smad1 and a homeoboxcontaining transcription factor, wherein said interaction induces a

BMP-responsive gene encoding a bone matrix protein which

produces osteoblast and/or chondroblast differentiation thereby
stimulating bone formation.

- 2. The method of claim 1, wherein said interaction is induced by means selected from the group consisting of phosphorylation of Smad1, overexpression of Smad1, and mutation of said homeobox-containing transcription factor.
- 3. The method of claim 1, wherein said homeobox-containing transcription factor is selected from the group consisting of Hoxc-8, Hoxa-9, Msx-1 and Msx-2.

4. The method of claim 1, wherein said BMP-responsive gene is selected from the group consisting of osteopontin, sialoprotein, osteonectin, and osteocalcin.

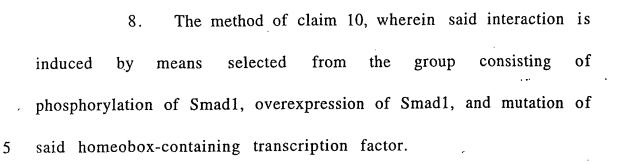
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- 5. The method of claim 1, wherein said individual is osteopenic.
- 6. A method of inducing gene(s) encoding bone matrix proteins, comprising the step of:

inducing an interaction between Smad1 and a homeoboxcontaining transcription factor, wherein said interaction results in an induction of gene(s) encoding bone matrix proteins.

7. A method of inducing a gene encoding osteopontin, comprising the steps of:

inducing an interaction between Smad1 and Hoxc-8, wherein said interaction results in removing transcriptional repression of a gene encoding osteopontin, thereby inducing said gene encoding osteopontin.



9. A method of screening for a compound that stimulates bone formation, comprising the steps of:

contacting a cell with a compound; and

determining the ability of said compound to inhibit binding of Hoxc-8 to a gene, wherein inhibition of binding results in induction of said gene, thus indicating that the compound stimulates bone formation.

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10. The method of claim 9, wherein said compound is selected from the group consisting of an antibody or fragment thereof, synthetic drugs, synthetic proteins and a phosphorylated form of Smadl or fragments thereof.

11. The method of claim 9, wherein determination of inhibition of binding of Hoxc-8 to a gene is by a method selected from the group consisting of a gel-shift assay, transcription, Northern blotting, and Western blotting.

12. The method of claim 9, wherein said gene is selected from the group consisting of osteopontin, sialoprotein, osteonectin, and osteocalcin.

- 13. A method of regulating disease in an individual, comprising the step of:
- 15 inhibiting the binding of a homeobox-containing transcription factor to a gene involved in regulating disease in cells of said individual, wherein inhibition of binding removes transcriptional repression by the homeobox-containing protein of said gene, thereby resulting in the induction of said genes involved 20 in regulating disease.

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- 14. The method of claim 13, wherein said inhibition is due to the presence of a compound that binds to the homeobox-containing transcription factor, thereby inhibiting the DNA binding ability of said homeobox-containing transcription factor.
- 15. The method of claim 13, wherein said compound is selected from the group consisting of an antibody or fragment thereof, synthetic drugs, synthetic proteins and a phosphorylated form of Smad1 or fragments thereof.
- 16. The method of claim 13, wherein said homeobox-containing transcription factor is selected from the group consisting of Hoxc-8, Hoxa-9, Msx1, and Msx2.

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17. The method of claim 13, wherein said individual has a disease selected from the group consisting of osteoporosis, cancer, cardiovascular disease and neurological disease.